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ADOA - ASET

Arizona Strategic Enterprise Technology

Project Investment Justification

Version 01.01

A Statewide Standard Document for Information Technology Projects

Project Title:

AELAS Standardized Student Data Store (SDS)

Agency Name:	Arizona Department of Education
Date:	December 20th 2013
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[Hover for Instructions](#)

I. Management Summary*

Currently, LEAs are required to submit student information data multiple times across various ADE business units. As part of the Data Governance/Collection program – about 200+ collection requirements across all program areas were identified. Of the 200+ collection points, 80 collections related to student specific data were identified and prioritized to map to the EDFI data model as a part of the Assessment phase of this PIJ. ADE now has deeper understanding of the EDFI data model and how it can be implemented.

The EDFI data model is organized into 16 base domains. Domains serve to provide views of the Ed-Fi Unifying Data Model to assist in its understanding and its application. In many cases, a specific Ed-Fi data exchange schema may only deal with data in a single domain, such as assessment or enrollment. In other cases, it may span several domains, such as with a student transfer record.

Implementation of Release 1 will provide LEA's visibility into the data submission process and expose points of bad data submission, empowering local officials to make informed changes.

The Release 1 implementation scope has been identified considering the mapped elements of key SAIS transactions, STC transactions, complexity, timeline and budget.

The scope of education data is large and its organization is complex and therefore complete implementation of all the Ed-Fi domains listed below will be a multi-year (Multi-PIJ) process.

EDFI Domains	Release 1 / 2 OR Future Release	Comment
<i>Alternative/Supplemental Services</i>	<i>Release 2</i>	
<i>Assessment</i>	<i>Release 2</i>	
Bell Schedule	Future	
<i>Discipline</i>	<i>Release 2</i>	
Education Organization	N/A	At this point not considering receipt of organization related data to be collected as part of EDFI based exchange
Enrollment	Release 1	
Finance	N/A	At this point not considering receipt of organization related data to be collected as part of EDFI based

		exchange
Graduation	Future	
Interventions	Future	
School Calendar	Future	
Staff	Release 2	Partial
Student Academic Record	Release 2	
Student Attendance	Release 1	
Student Cohort	Future	
Student Identification and Demographics	Release 1	
Teaching and Learning	<i>Release 1</i> Release 2	<i>Approx. 50%, elements required for the SAIS and STC transactions in Release 1 and remaining in Release 2</i>

II. Project Investment Justification (PIJ) Type*

☐ Yes ☒ No Is this document being provided for a Pre-PIJ / Assessment phase?

If Yes,

Identify any cost to be incurred during the Assessment phase.	\$
Based on research done to date, provide a high-level estimate or range of development costs anticipated for the full PIJ.	\$

Explain:

☐ Yes ☒ No Will a Request for Proposal (RFP) be issued as part of the Pre-PIJ or PIJ?

III. Business Case

A. Business Problem*

- The primary system which captures student data is a fragile application utilizing outdated architecture and the technology is difficult and costly to maintain.

- LEAs are required to submit student information data multiple times across various ADE business units.
- Program areas across the agency operate in silos and, in just about all data submissions, there is data redundancy.
- Data is submitted in different formats from different program areas causing incorrect reporting, incorrect funding, and a huge task force is needed within ADE to support the LEA's need to address data integrity issues.
- Specialized team members are required at the LEAs to support these data submissions and track the multitude of format and requirement changes.
- Program areas within the agency are operating in silos due to the perceived lack of data integrity of the data.
- Additionally the high cost involved with LEAs support of student related data, there are additional recurrent data submissions and reporting mandates that need to be met.

B. Proposed Business Solution*

Streamline the student related data collection by utilizing a standard data model. Adopting the Ed-Fi standard and maintaining compliance will ensure reporting continuity, data integrity and compliance with requirements across district, state and federal levels.

The Ed-Fi solution:

- Aggregates information from a broad range of disparate data sources
- Provides districts and states the capability to provide consistent and comparable performance data across schools, districts and programs
- Extends existing data systems' capabilities
- Integrates easily into existing IT environments
- Facilitates cost-effective implementation
- Aligns with existing local systems as well as federal standards such as Common Education Data Standards (CEDS)
- Reduces both time and money spent on state- and federal-level reporting
- Is designed to accommodate future education data innovations and evolving accountability requirements

Release 1 proposed in this PIJ is a subset of the Ed-Fi solution.

Release 1 is intended to identify the core attributes of the student data store. A business logic layer that will sit atop the data store will enforce the business rules, and those rules will be tried and tested during its deployed use by adopting LEAs. Data that has been processed by the Business logic layer will then be

transferred to the Agency Operational Data Store and tested by other data domains (from other projects/AELAS PIJ's) that utilize or have dependencies on it.

The following Student transactions are in Scope for this Release 1: FY 2014

- 001 Student Enrollment
- 002 Student Re Admissions
- 003 Student Withdrawals
- 004 Student Absence
- 005 Student Personal Information
- 006 Student Membership Change
- 007 Student District of Residence Transfer
- 008 Students FTE
- 009 Student Grade Transfer
- 010 Student payer Factors
- 011 Support Program Participation Transactions
- 013 Language Program Participation
- 014 SPED Service Participation
- 015 Support Program Participation Transactions
- 016 Student Year End Statuses
- 017 Student Attendances
- 018 Student Summer Withdrawals
- 020 Community College Classes
- Student Teacher Course Connections

The following Student transactions are in Scope for this Release 2: FY 2015

- Review and improve based on Pilot Feedback. (Infrastructure and Process)
- Student Teacher Course Connections (For elements not identified in R 1)
- 11 All Needs
- 13 Languages Program Participation
- 14 SPED;
- 15 Support programs
- 20 Community College (For elements not identified in Release 1)
- 22 Student Test Label
- 23 Early Childhood Program Participation
- 24 Early Childhood Preschool Assessment
- 25 Dropout Recovery
- 26 Grand Canyon Diplomas

ODS Design and Development (Phase 2)

1. Review/Update one-time load from Enterprise to EdOrg;
2. Review/update the one time loads and Implement recurring loads for 6 domains:
 - Calendar;
 - Student Identification and Demographics
 - Student enrollment; Student Attendance
 - Teaching and Learning (partial);
 - Staff (partial)
3. Configure and Implement additional EDFI domains:
 - Staff (Partial)
 - Teaching and Learning (For elements not identified in Release 1)
 - Student Discipline
 - Student Academic Record
 - Assessments
 - Alternative/Supplemental Services (4 sub-domains}
4. Configure and Implement additional Assessment Sources:
 - PCG
 - ATI
 - ACT
 - SAT
 - Explorer

The following Services will be delivered as part of the scope of the Release:

- **Ed-Fi Data Interchange**

- Ed-Fi REST API – web services to receive student enrollment, attendance, student course connection and other student information from the LEA SIS.
- LEA-Data – database to store the data received from the LEA SIS.
- ADE-Connect Integration – enables the SIS to authenticate with ADE-Connect and securely Transmit the data to the web services.
- Course, Organization, Student and Staff ETL – package to load course, organization, student and staff data to the LEA-Data database so the student data can be validated for data integrity when it is submitted through the web services.

- **Student Information Rules Service**

- Data Extraction Engine – extracts the student information data that has been modified since the last time the business rules processing was executed.
- Business Rules Engine – stores the business rules that an enrollment, attendance or student course connection data has to comply with based on the statutes or ADE business rules. The business rules engine will allow the rules to be maintained outside of the rules processing source code, so that it can be changed using a business rules editor if a statute change impacts the business rule.

- Business Rules Processor – process the student data extracted and calls the business rules engine to apply the appropriate business rule for the type of student information being processed. Captures any business rule exceptions from the rules engine and stores that in the Exceptions database. Pushes the valid student data to the Agency-ODS.
- Exceptions database – database to hold any business rule exceptions data so it can be retrieved by the SIS using a web service.
- Exceptions Web service – web service that exposes the business rule exceptions, so the SIS can consume it and have the LEA data steward correct the exceptions.
- **Data Validation Service**
 - Data from the new Ed-Fi Student Data Interchange will be compared and verified against SAIS Transaction and Integrity.
- **Agency-ODS ETL**
 - ETL process to load Student information data that is required for Post-Secondary and SLDS from current SAIS Student-Details database into the Agency ODS.

To better align with business needs, the following scope changes will be part of the Release 2: FY2015:

- *EDFI Domains:*
 - *Continue to complete the 9 domains as part of Release 2, with the exception of the below additions and removal.*

<i>EDFI Domains</i>	<i>Release 2</i>	<i>Change for FY2015</i>
<i>Alternative/Supplemental Services</i>	<i>Release 2</i>	<i>Partial as required per the legacy SAIS transactions</i>
<i>Discipline</i>	<i>Release 2</i>	<i>Removed</i>
<i>School Calendar</i>	<i>Release 2</i>	<i>Added</i>
<i>Student Cohort</i>	<i>Release 2</i>	<i>Added</i>

- *ODS Design and Development (Phase 2)*
 - *The ODS design and development will incorporate the changes as outlined by the EDFI domains. The changes to the data added or removed from EDFI domains are based on further analysis of the data dependency need from the Release 2 SAIS transactions. In order to complete all the SAIS transactions and support the downstream School Finance payments, the corresponding changes are needed for the ODS design and development.*
- *915 Process*
 - *The 915 Process allows student data and budget capacity changes for prior years, pursuant to ARS § 15-915. This process impacts the overall service delivery of the EDFI interchanges and the subsequent finance payment streams. The project needs to incorporate these requirements*

for analysis and development to continue making progress on the planned overall legacy SAIS de-commission.

- **Unique ID / Split Merge**

- *The default EDFI interchange provided by DLP (vendor partner for EDFI Alliance) does not handle the volumes needed by Arizona. The default solution also does not address the need to provide correct unique id to students in case where one student has been assigned two unique ids (Merge) or also when a single id has been assigned to two students (Split). ADE is required to develop a solution that can handle the state student population volume, utilize better search criteria and add clean up data tasks to handle data entry mistakes.*

- **EDFI Submission Workaround**

- *Not all LEAs will be able to meet the mandated date of July 1, 2015. A temporary workaround solution needs to be developed to accommodate LEAs who are not able to meet the EDFI submission. This workaround solution will be in place for FY16 to allow for school payments and state reporting to occur until the LEAs can migrate their SIS to a new system.*

- **Charter Estimated Counts –**

- *As part of the overall 915 process and the initial analysis of the current submission for charter estimated counts, the project calls for additional requirements analysis and design for EDFI because of some concerns with accuracy and timeliness in the data submission. The EDFI solution can be used to increase accuracy and efficiency in the data gathering techniques that are then used in the payment calculations.*

C. Quantified Benefits*

<input checked="" type="checkbox"/>	Service enhancement
<input type="checkbox"/>	Increased revenue
<input checked="" type="checkbox"/>	Cost reduction
<input checked="" type="checkbox"/>	Problem avoidance
<input checked="" type="checkbox"/>	Risk avoidance

Explain:

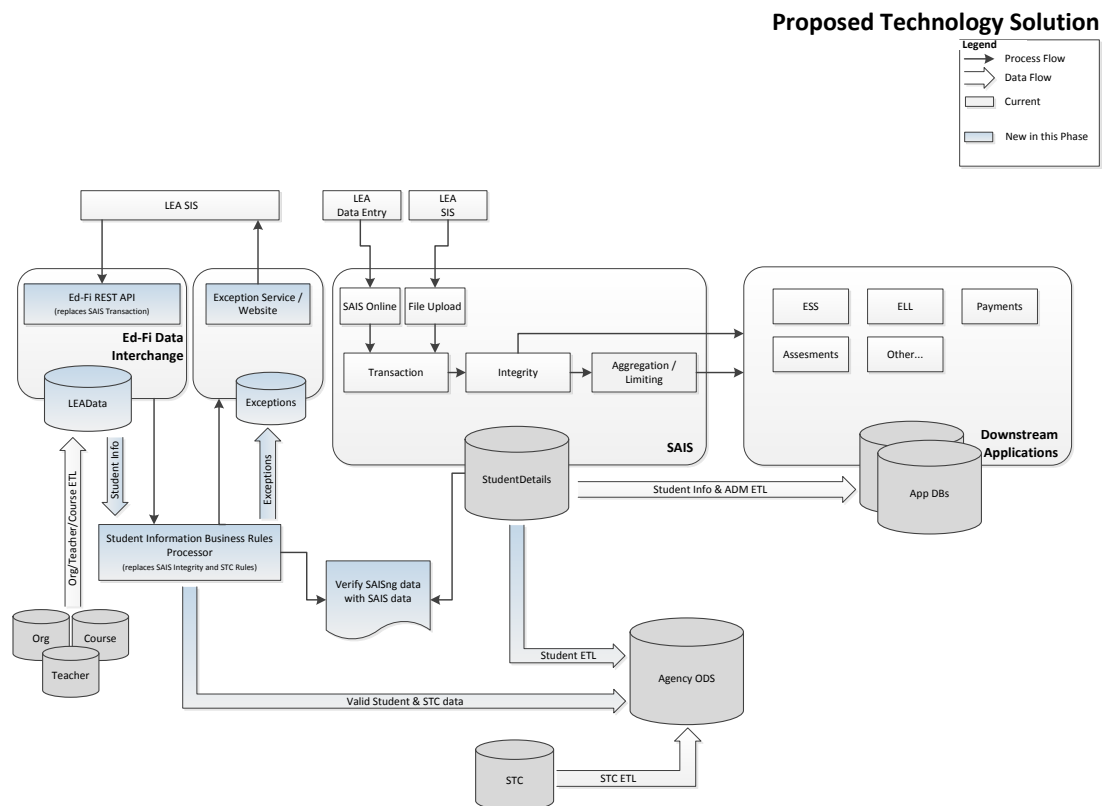
Improvements in our data assets will eventually lead to replacing numerous applications with an integrated platform of core capabilities such as identity management, reporting, and a single business rules engine to meet the legislative changes in an efficient manner. Improvements at the agency will enable districts and charter schools to reconsider their resource allocation to data management, cleanup, and reaction to the constant requests from ADE for more data.

1. Reduce the number of data elements utilized for LEA reporting
2. Reducing the number of data collection points will eliminate the silo affect within the agency thus ensuring the data integrity

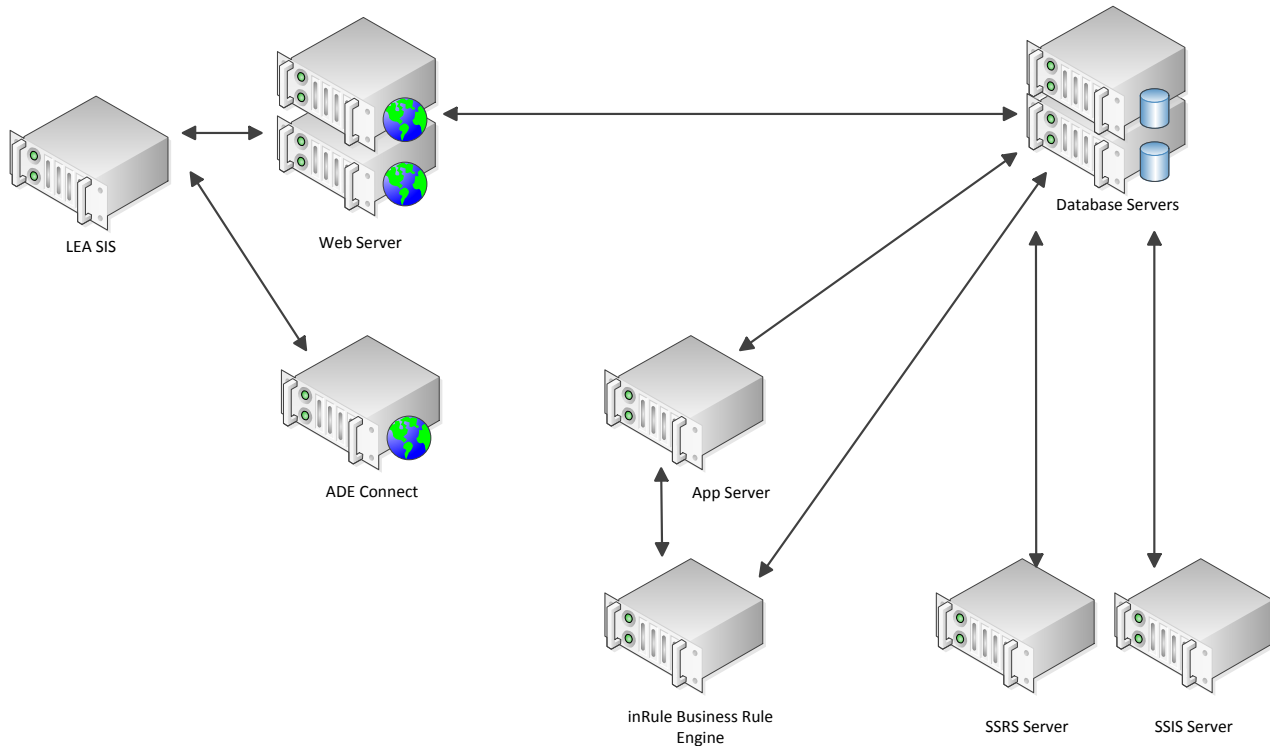
3. Eliminate the redundancy of many student data elements collected by the various program areas within the agency
4. Student Data elements used for reporting will be standardized within the agency
5. Enable student-related data sharing in such a way as to minimize replication and errors
6. Provide interoperability between the numerous program areas

IV. Technology Approach

A. *Proposed Technology Solution**



The Ed-Fi SDS web services, application process and database components will be deployed on various servers for performance and scale out reasons. The system will be deployed on the new hardware that will be provisioned as part of the phase 1 of this project. The Deployment Model figure below shows the various servers involved and the roles of each server.



LEA SIS

The LEA SIS hosted by the LEA will be the primary system that will integrate with the Ed-Fi SDS web services that are hosted on the ADE side. Communication between the SIS and the Agency Web services server will be enabled through https web protocol. The SIS will first have to authenticate with the ADE Connect and obtain an authentication token. The SIS will then have to supply the authentication token with every web service request.

Web Server

The Edi-Fi REST API web services and the Exceptions web service will be deployed to the web servers. The web servers should be load balanced in production environment. These web services should be deployed to IIS on the server. IIS should be configured to use its own application pool. The application pool identity should be configured to use a service account provisioned through Active Directory.

ADE Connect

The web services will use ADE Connect to validate the authentication token submitted with the request.

App Server

The Student Business Rules processor will be deployed to this App server. The rules processor will use the inRule rules engine to validate the rules.

InRule Business Rules Engine Server

The student transactions that are collected through the web services will have to be validated against business rules that are deployed to InRule Business rules engine. This business rules engine is deployed on its own server.

Database Server

The new student transaction database should be hosted in a clustered database server in production environment.

SSRS Server

A variety of reports are to be generated by the new Ed-Fi SDS system. The reports will be implemented using SQL Server Reporting Services (SSRS) and deployed to the SSRS Server.

SSIS Server

ETL packages will be developed to extract organization data from Agency ODS and load it into the new student transaction database. Similarly ETL packages will be developed to extract student data from SAIS database or the Student transaction database and load it to the Agency ODS. These ETL packages will be developed using SQL Server Integration Services (SSIS) and will be deployed to the SSIS Server.

B. Technology Environment

Technology Stack

The following technologies are selected to fulfill the requirements of the Ed-Fi SDS project.

- Microsoft Windows 2008 R2 or 2012 Server for Operating system
- Microsoft .Net 4.5 framework with C# programming language
- Microsoft ASP .Net MVC4 for Web User Interface
- Microsoft Windows Communication Services (WCF) 4.5 for Web services
- Microsoft Entity Framework 6.0 or Dapper for Data Access
- Microsoft SQL Server 2008 R2 or 2012 for database server
- Microsoft SQL Server Integration Service (SSIS) 2008 R2 or 2012 for ETL packages
- Microsoft SQL Server Reporting Services (SSRS) 2008 R2 or 2012 for reports
- InRule 4.5 for Business Rules Engine

The proposed technology stack listed above will eventually replace the current system that is built on decade old technology such as VB6, COM+, ASP and SQL Server 2000.

This proposed infrastructure will support the scope identified for Release 1.

For subsequent releases based on release scope and as more LEA's adopt the Ed-Fi model the infrastructure will have to scale, and those needs will be identified in subsequent PIJ's.

Changes to the Technology FY2015:

Over and above the hardware in use for the project, the project will also use the Azure Cloud environment to support performance needed to handle the large volume of transactions.

- Web servers will be placed in the Azure Cloud environment which will handle the data collection from the LEAs.
- Valid LEA data will be stored in a data store located in the Azure cloud. When the data is checked against Business Rules, clean data will be passed onto the Agency ODS located on premise.
- Two legged OAuth 2.0 security framework is used to integrate between LEA systems and ADE systems.
- The operational costs of Azure are not paid through this PIJ. The ongoing subsequent Azure costs are slated to be paid by ADE operational budget.

OAuth

- OAuth 2.0 will be used to authenticate EDFi submission from LEAs. The OAuth is part of the EDFI Alliance API development. ADEConnect will continue to be used for authentication and authorization for LEAs to access their reports.

C. Selection Process

In October 2012, the Data Governance Commission enforced the recommendation to implement Master Data Management policy using the Common Education Data Standards (CEDS) and Ed-Fi as the state adopted standard moving forward for any new development and procurement.

The Ed-Fi solution is a universal educational data standard and tool suite that enables vital academic information on K-12 students to be consolidated from the different data systems of school districts while leaving the management and governance of data within those districts and states. The standard and tool suite includes a unifying data model, data exchange framework, application framework, and sample dashboard source code. The Ed-Fi solution is open, XML-based, and CEDS-aligned to integrate information from a broad range of existing sources so it can be sifted, analyzed and put to use every day. Ed-Fi components act as a universal translator of academic data, integrating and organizing information.

ADE is aligning its data collection, business process and technical to Ed-Fi standards. This proposed project is one of the many steps required to meet the Data Governance Commission's recommendation.

V. Project Approach

A. *Project Schedule**

Project Start Date: 7/1/2013 **Project End Date:** 6/30/2015

B. *Project Milestones*

Major Milestones	Start Date	Finish Date
Stand up, configure and test servers	2/01/2014	4/15/2104
Ed-Fi Data Interchange	2/01/2014	6/30/2014
Student Information Rule Service	2/01/2014	6/30/2014
Agency ODS ETL	2/01/2014	6/30/2014
Stand up, configure Azure	10/01/2014	1/31/2015
Ed-Fi Data Interchange for Release 2	7/01/2014	6/30/2015
Student Information Rule Service for Release 2	7/01/2014	6/30/2015
Agency ODS ETL for Release 2	7/01/2014	6/30/2015

VI. Roles and Responsibilities

A. *Project Roles and Responsibilities*

Project Sponsor – The project sponsor will represent ADE’s business needs for the project. The Sponsor serves as providing the agency commitment to the project, and signs off on any changes or acceptance criteria for agreed-upon deliverables. The project sponsor also provides guidance to the Project Manager and implementation team regarding general policy or outcomes.

Project Manager – The project manager serves as the lead for the project and ensures fulfillment of tasks and outcomes for the project. This manager is also the point person for interactions with the vendor and any other contractors brought on to implement the project. The project manager is expected to:

- Plans and conducts meetings with Project sponsor
- Develops overall Project Plan
- Manages individual tasks and the resources assigned to accomplish tasks
- Directs issue management process
- Completes status reports for ADE audiences
- Manages any changes in scope
- Conducts weekly project meetings
- Signs off on deliverables or change orders along with the Project Sponsor

Data Architect - The data analyst role for this project is critical for documenting and explaining the relationships between various data elements within the system and other integrated systems. The Data Architect will also develop the new database design and data warehousing schemas. The data architect will also support the technical lead and project manager during the testing and migration phase of the project to ensure that business data is being handled properly and is able to be used as required by ADE

Solutions Architect – The solutions architect is a vital member of the project team and will assist the project team in developing the solution in accordance with ADE standards and guidelines. The solutions architect will assist the project team in resolving issues surrounding the integration with various systems as they arise during implementation.

Business Analyst – The business analyst serves as the lead for translating business requirements into a format understandable for the technical team. The ADE business analyst for this project will see most of his/her work during the requirements gathering and preparation phase of the project. The analyst will then remain part of the team and will handle ongoing issues and requirement changes as they arise.

Technical Lead – The technical lead serves an important role in supporting the project manager by directing technical development, including coding and roll-out of the software but also testing and migration processes. The Technical lead is also responsible for resolving technical issues throughout implementation and ensuring the solution meets technical specifications identified by ADE.

Lead Developer

Responsible for reviewing the technical detail designs with the Architect/Developer and providing technical guidance, defect resolution as needed, and providing regular updates to the Project Manager.

Developer

Responsible for development and unit testing the requirements/use cases and detail designs, with defect resolution as needed.

Quality Analyst

Responsible for Creating and maintaining a Master Test Plan, Ensuring availability of resources , Estimating, budgeting, and planning, Executing the master test plan within budget and time constraints, Reporting on progress and quality of end product, ensuring that all conditions have been met.

B. Project Manager Certification

- | | |
|--|---|
| <input checked="checked" type="checkbox"/> | Project Management Professional (PMP) Certified |
| <input type="checkbox"/> | State of Arizona Certified |
| <input type="checkbox"/> | Project Management Certification not required |

C. Full-Time Employee (FTE) Project Hours

Total Full-Time Employee Hours	0
Total Full-Time Employee Cost	\$0

VII. Risk Matrix, Areas of Impact, Itemized List, PIJ Financials



Project Investment
Justification Financial:



Project Investment
Justification Financial:

VIII. Project Approvals

A. Agency CIO Review*

Key Management Information	Yes	No
1. Is this project for a mission-critical application system?	X	
2. Is this project referenced in your agency's Strategic IT Plan?	X	
3. Is this project in compliance with all agency and State standards and policies for network, security, platform, software/application, and/or data/information as defined in http://aset.azdoa.gov/security/policies-standards-and-procedures , and applicable to this project? If NO , explain in detail in the "XI. Additional Information" section below.	X	
4. Will this project transmit, store, or process sensitive, confidential or Personally Identifiable Information (PII) data? If YES , in the "XI. Additional Information" section below, describe what security controls are being put in place to protect the data.	X	
5. Is this project in compliance with the Arizona Revised Statutes (A.R.S.) and GRRC rules?	X	
6. Is this project in compliance with the statewide policy regarding the accessibility to equipment and information technology for citizens with disabilities?	X	

B. Project Values*

The following table should be populated with summary information from other sections of the PIJ.

Description	Section	Number or Cost
Assessment Cost (if applicable for Pre-PIJ)	II. PIJ Type - Pre-PIJ Assessment Cost	\$630,000.00
Total Development Cost	VII. PIJ Financials tab	\$920,000.00 + \$2,200,000.00
Total Project Cost	VII. PIJ Financials tab	\$3,750,000.00
FTE Hours	VI. Roles and Responsibilities	

C. Agency Approvals*

Contact	Printed Name	Signature	Email and Phone
Project Manager:	Ranjith Menon Randall Lohn (starting September 2015)		Ranjith.Menon@azed.gov 602-638-7108 Randall.Lohn@azed.gov 602-617-5864
Service Delivery Manager	Komal Dubey		Komal.Dubey@azed.gov 480-544-1514
Director – Program Support Office	Lisa Blyler		Lisa.Blyler@azed.gov 602-542-3144
Agency Information Security Officer:	Ed Jung		Ed.Jung@azed.gov 602.542.3545
Agency CIO:	Mark Masterson		Mark.Masterson@azed.gov 602-542-3542
Project Sponsor:	Elliott Hibbs		Elliott.Hibbs@azed.gov 602-364-2347

IX. Optional Attachments

A. Vendor Quotes



EdFi SDS Infra Cost
Est.pdf

X. Glossary

Acronym	Definition
ADE	Arizona Department of Education
ASP	Active Server Pages
CEDS	Common Education Data Standards
COM	Microsoft Component Object Model
Ed-FI	Education Data Fidelity
ETL	Extract Transform Load
InRule	A commercially available Business Rules management software
LEA	Local Education Agency
MVC	Model View Controller
ODS	Operational Data Store
REST API	Representational State Transfer ; Application Programming Interface
SAIS	Student Accountability Information System
SIS	Student Information System
SLDS	Statewide Longitudinal Data System
SQL	Structured Query Language, is a special-purpose programming language designed for managing data held in a relational database management system
SSIS	Microsoft SQL Server Integration Service
SSRS	Microsoft SQL Server Reporting Services
STC	Student Teacher Course Connection
VB	Visual Basic
XML	Extensible Markup Language

XI. Additional Information

Security controls to protect the data.

Web Service Transport Layer Security

Communication between the LEA SIS and the ADE web services will use https protocol to encrypt the messages during transmission, so it could not be eavesdropped.

Web Service Authentication

Each LEA SIS that needs to communicate with the ADE web services will have to register with the ADE Connect (authentication/authorization system). Once a LEA SIS account is registered with ADE it is assigned a unique application user id and a certificate. The certificate will then have to be installed on the SIS machine that will communicate with the ADE web service. The SIS will have to be configured to pass along the certificate with the web service request. The ADE web service and will first validate the certificate with ADE Connect and accept or reject the request.

Database Access Security

The web service will be configured to run under an Active Directory service account. Different service account will be provisioned for each environment such as Development, QA and Production. The service accounts will then be granted read / write / execute permissions against the database or network or file objects in appropriate environments. The production database access will be restricted only to the production service account and the database administrators.

Exception Management

Any error messages returned by the web services or other underlying components of the web service should only contain minimal levels of information and does not expose any internal implementation details. Any abnormal web services exceptions will be handled and logged to an application exception log file for analysis and correction. The web services will be configured to not display any of the internal details of the exception to the consumer.

Links:

[Ed-Fi Solution in Action](#)

[ADOA-ASET Website](#)

[ADOA-ASET Project Investment Justification Information Templates and Contacts](#)

Email Addresses:

[Strategic Oversight](#)

[ADOA-ASET Webmaster@azdoa.gov](mailto:Webmaster@azdoa.gov)